

IN THE CLAIMS:

Please revise the claims as follows:

1. (Previously Amended) An electronic circuit wiring interconnect package test and repair apparatus, comprising:

at least one wiring analyzer to locate shorts between conductors, said conductors being on a surface of or embedded in a carrier substrate, said conductors being intended to interconnect components to be mounted on said carrier substrate to form a circuit, said carrier substrate being devoid of all said components;

a current source to provide current sufficient to remove said shorts; and

~~at least two~~ a cluster probe, comprising a plurality of probes, to contact said conductors in a manner controlled by said wiring analyzer.

2. (Original Claim) The test and repair apparatus of claim 1, wherein said at least one wiring analyzer comprises at least one relay wiring analyzer and at least one solid state wiring analyzer, thereby providing at least two different testing speeds.

3. (Currently Amended) The test and repair apparatus of claim 1, further comprising a controller for automatic positioning of said ~~at least two probes~~ cluster probe.

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5. (Original Claim) The test and repair apparatus of claim 1, further comprising a controller having voltage stress test capability.

6. (Currently Amended) The test and repair apparatus of claim 1, further comprising a controller to automate at least one of said locating of said circuit shorts and said removing of said located circuit shorts.

7. (Previously Amended) The test and repair apparatus of claim 1, wherein said at least one wiring analyzer additionally locates open circuits that are defects in said carrier substrate.

8. (Original Claim) The test and repair apparatus of claim 6, wherein said controller performs a plurality of attempts to remove said shorts.

9. (Currently Amended) A method of testing and repair of wiring interconnect packages, comprising:

contacting, at a predetermined set of locations, a wiring interconnect package under test, using a cluster probe containing a plurality of probes;

applying a predetermined set of voltage levels in a predetermined sequence to predetermined probes in said cluster probe;

measuring a response to each application of voltages to detect any open or short circuits in said wiring interconnect package; and

for any detected short circuits, applying a predetermined voltage to attempt to remove a detected short circuit,

wherein said applying of voltages to attempt to remove a detected short circuit and said measuring of responses to detect any short circuits uses a same apparatus that is used for said attempt to remove said short circuits.

10. (Original Claim) The method of claim 9 wherein at least one of the following is automated:

- said contacting at a predetermined set of locations;
- said detecting of abnormal open circuits or short circuits; and
- said attempting to remove said short circuits.

11. (Original Claim) A method of automatically testing and repairing wiring interconnect packages, comprising:

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- contacting, at a predetermined set of locations, a wiring interconnect package under test using a cluster probe containing a plurality of probes;
 - automatically applying a predetermined set of voltage levels in a predetermined sequence to predetermined probes in said cluster probe;
 - automatically measuring a response to each application of voltages to detect any open or short circuits in said wiring interconnect package; and
 - for any detected short circuits, automatically applying a predetermined voltage to attempt to remove said detected short circuit.

12. (Original Claim) The method of claim 11, wherein said detecting of any opens or shorts is executed at a first higher speed using a solid state switching module and said attempting to remove shorts is executed using a relay switching module.

13. (Original Claim) The method of claim 11, where said contacting of said wiring interconnect package is additionally automatically actuated by a controller.

14. (Currently Amended) An apparatus for testing and repair of wiring interconnect packages, comprising:

at least one wiring analyzer to locate circuit shorts;

a current source to provide current sufficient to remove said shorts; and

a cluster probe to contact predetermined locations on a wiring interconnect package under evaluation.

15. (Original Claim) The test and repair apparatus of claim 14, wherein said at least one wiring analyzer comprises at least one relay wiring analyzer and at least one solid state wiring analyzer, thereby providing at least two different testing speeds.

16. (Original Claim) The test and repair apparatus of claim 14, further comprising a controller to automatically position said cluster probe.

17. (Original Claim) The test and repair apparatus of claim 14, further comprising a controller for a voltage stress test capability.

18. (Currently Amended) The test and repair apparatus of claim 14, further comprising:

a controller so that at least one of locating of said circuit shorts and removing of said circuit shorts is automated.

19. (Original Claim) A signal-bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform a method of testing and repair of wiring interconnect packages, comprising:

contacting, at a predetermined set of locations, a wiring interconnect package under test using a cluster probe containing a plurality of probes;

applying a predetermined set of voltage levels in a predetermined sequence to predetermined probes in said cluster probe;

measuring a response to each application of voltages to detect any open or short circuits in said wiring interconnect package; and

for any detected short circuits, applying a predetermined voltage to attempt to remove a detected short circuit,

wherein said applying of voltages and said measuring of responses to detect any short circuits uses a same apparatus that is used for said attempt to remove said short circuits.

20. (New) The apparatus of claim 1, further comprising:

a controller to control said wiring analyzer and to control said current source,

wherein said controller controls said wiring analyzer to perform an analysis of all said conductors contacted by said cluster probe prior to attempting to remove any located short circuit and said attempt to remove short circuit occurs without moving said cluster probe.

21. (New) The apparatus of claim 20, wherein, after attempting to remove said located short circuits and prior to moving said cluster probe, said controller thereafter uses said at least one wiring analyzer to again locate shorts between said plurality of conductors.

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22. (New) The apparatus of claim 5, wherein said voltage stress test is executed prior to moving said cluster probe, and prior to moving said cluster probe, said controller uses said at least one wiring analyzer to again locate shorts between said plurality of conductors.
